Reg. No ..... Name **24U362**

B.Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2024

SEMESTER 3 : COMPLEMENTARY PHYSICS FOR MATHEMATICS

COURSE : **19U3CPPHY5 : MODERN PHYSICS AND ELECTRONICS**

(For Regular 2023 Admission and Improvement/Supplementary 2022/2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 60

PART A

Answer any 8 (2 marks each)

1. What makes the nucleus positively charged? Will it retain its positive charge even after postiron emission?
2. Write the four properties of a Junction transistor.
3. What is meant by a normalised wave function?
4. Explain molecular spectra
5. Give the spectral terms corresponding to L=2 and S=1/2.
6. Convert the following decimal numbers to their binary equivalents (i) 255 (ii) 25
7. If a nucleus ${}_{Z}X^{A}$ emits one alpha particle and β- -particle(beta negative) in succession, then write the configuration of the daughter nucleus .
8. What is natural radioactivity? Who discovered it?
9. Add the two binary numbers 0000 1110 and 0000 0110.
10. Name two semiconductors used in industry.

(2 x 8 = 16)

PART B

Answer any 6 (4 marks each)

11. Given the wavelength of Hα line as 6.563×10^{-7} m, Calculate the wavelength of the line of shortest wavelength in Lymann series.
12. Estimate the de Broglie wavelength associated with an electron having kinetic energy 1 ev.
13. You are given three two input NAND gates. Show how they can be connected to get an OR gate. Establish the truth table.
14. In a common base connection, current amplification factor is 0.9. If the emitter current is 1mA, determine the value of base current.
15. The work function of barium and tungsten are 2.5eV and 4.2eV respectively. Check whether these materials are useful in a photocell, which is to detect visible light.
16. Convert the following hexa decimal numbers to their decimal equivalents (i) C (ii) 9F (iii) ABCD (iv) EBA.C
17. Calculate the time required for 10% of a sample of Thorium to disintegrate. Assume the half-life of Thorium to be 1.4×10^{10} years.
18. In a common base connection , the emitter current is 1mA. If the emitter circuit is open, the collector current is 50 μA. Find the total collector current. Given α = 0.92.

(4 x 6 = 24)

PART C

Answer any 2 (10 marks each)

19. Give an account of the Bohr model of the atom. Explain the origin of spectral lines of hydrogen on the basis of this theory.

20. Describe Davisson and Germer experiment and show that electrons behave like waves.
21. What is a full adder? Write its logic expressions and truth table. Design a full adder using XOR, AND and OR gates.
22. Describe the working of a centre -tap full wave rectifier with a neat circuit diagram and derive its efficiency.

(10 x 2 = 20)